

## CLAIMS

1. A liquid fuel delivery system for delivering liquid fuel to apparatus for utilizing energy produced from burning said liquid fuel, said liquid fuel delivery system comprising:

- 5           a source of said liquid fuel,  
          a liquid fuel metering device coupled to said source of said liquid fuel and providing metered quantities of said liquid fuel,  
          a closed liquid fuel fog-producing device coupled to said liquid fuel metering device and receiving said metered quantities of said liquid fuel, said  
10 liquid fuel fog-producing device configured to process said metered quantities of said liquid fuel into a fog of fuel droplets of a maximum predetermined size and provide said fog of fuel droplets of a maximum predetermined size to said apparatus.

- 15 2. A liquid fuel delivery system as set forth in claim 1 wherein said predetermined maximum size of said fuel droplets is about 50 microns in diameter, with the fuel droplets being predominantly in a range of from about 10 microns or so to about 30 microns or so.

- 20 3. A liquid fuel delivery system as set forth in claim 2 wherein said liquid fuel metering device and said closed liquid fuel fog-producing device are incorporated into a single, unitary housing communicating with an induction flow of said apparatus.

- 25 4. A liquid fuel delivery system as set forth in claim 2 wherein said liquid fuel metering device and said liquid fuel fog-producing device are separate, discrete components sealed against any external source of gas.

- 30 5. A liquid fuel delivery system as set forth in claim 3 wherein said liquid fuel fog-producing device comprises a tube having a plurality of turbulence-inducing devices therein.

6. A liquid fuel delivery system as set forth in claim 5 wherein each

turbulence-inducing device of said turbulence-inducing devices comprises a disk having a central opening.

7. A liquid fuel delivery system as set forth in claim 6 wherein each said disk  
5 further comprises slits extending away from said central opening.
8. A liquid fuel delivery system as set forth in claim 6 further comprising a gas reservoir communicating with said tube.
- 10 9. A liquid fuel delivery system as set forth in claim 8 wherein said liquid fuel is injected into an end of said tube communicating with said gas reservoir.
10. A liquid fuel delivery system as set forth in claim 6 further comprising a liquid fuel heater that causes a portion of the liquid fuel to flash into vapor  
15 when released from said liquid fuel metering DEVICE.
11. A liquid fuel delivery system as set forth in claim 2 wherein said liquid fuel metering device and said liquid fuel fog-producing device are part of a gasoline engine.
- 20 12. A liquid fuel delivery system as set forth in claim 2 wherein said liquid fuel metering device and said liquid fuel fog-producing device are part of a turbine or jet engine.
- 25 13. A liquid fuel processing and delivery apparatus used in combination with an internal combustion engine comprising:
- at least one combustion region for said internal combustion engine,  
an induction air flow for said at least one combustion region of said internal combustion engine,
- 30 a source of said liquid fuel,  
at least one liquid fuel metering device coupled to said source of said liquid fuel, said liquid fuel metering device delivering metered quantities of said liquid fuel in a close stoichiometric relationship with said induction

airflow for said at least one combustion region,

a liquid fuel, size limited droplet-producing device coupled to receive said metered quantities of said liquid fuel and deliver a stabilized fog of liquid fuel droplets having a maximum predetermined size to said induction airflow,

5 a housing enclosing said fuel metering device and said liquid fuel, size limited droplet-producing device, incorporating said liquid fuel metering device and said liquid fuel, size limited droplet-producing device into a single, discrete component,

10 whereby when said stabilized fog of liquid fuel droplets having a maximum predetermined size are ignited in said combustion region, said liquid fuel droplets burn completely within said close stoichiometric relationship.

14. A liquid fuel processing and delivery apparatus as set forth in claim 13  
15 wherein said liquid fuel, size limited droplet-producing device produces liquid fuel droplets of less than about 50 microns in diameter.

15. A liquid fuel processing and delivery apparatus as set forth in claim 13  
20 wherein said liquid fuel, size limited droplet-producing device produces liquid fuel droplets predominantly within a range of about 10 - 30 microns in diameter.

16. A liquid fuel processing and delivery apparatus as set forth in claim 13  
25 wherein said fog of liquid fuel droplets is cooled by evaporation of some of said liquid fuel to effect stabilization thereof.

17. A liquid fuel processing and delivery apparatus as set forth in claim 13  
30 wherein said liquid fuel, size limited droplet-producing device further comprises a tube containing at least one turbulence-inducing device, said tube receiving said metered quantities of said liquid fuel at one end and providing said stabilized fog of liquid fuel droplets of a maximum predetermined size from an opposite end.

18. A liquid fuel processing and delivery apparatus as set forth in claim 17 wherein said one end of said tube receiving said metered quantities of said liquid fuel is provided with a gas reservoir.

5 19. A liquid fuel processing and delivery apparatus as set forth in claim 18 wherein said gas reservoir and said one end of said tube are closed to external gases.

10 20. A liquid fuel processing and delivery apparatus as set forth in claim 17 wherein said turbulence-inducing device further comprises a disk having an opening generally located in a center of said disk.

21. A liquid fuel processing and delivery apparatus as set forth in claim 20 wherein said disk has a plurality of slits extending away from said opening.

15 22. A liquid fuel processing and delivery apparatus as set forth in claim 21 wherein edges of said disk forming said slits are configured to angularly direct gas flow through said slits so that said gas flow and said droplets spiral through said tube.

20 23. A liquid fuel processing and delivery apparatus as set forth in claim 14 further comprising a fuel heater for heating said liquid fuel whereby a portion of heated said liquid fuel flashes into vapor when released by said fuel metering device.

25 24. A fuel delivery system for an internal combustion engine having an engine controller for controlling a flow of liquid fuel in accordance with induction airflow and comprising:

30 a pressurized supply of liquid fuel,  
at least one fuel metering and processing apparatus further comprising:

a housing coupled to said pressurized supply of liquid fuel,  
a liquid fuel metering device within said housing and

responsive to said engine controller to provide metered quantities of said liquid fuel in a close stoichiometric relationship with said induction airflow,

a liquid fuel fog-producing device in said housing, said liquid fuel fog-producing device receiving said metered quantities of said liquid fuel from said liquid fuel metering device, and processing said metered quantities of said liquid fuel into a fog of liquid fuel droplets of a maximum predetermined size, said fog of liquid fuel droplets provided to said induction airflow.

25. A fuel delivery system as set forth in claim 24 wherein said maximum predetermined size of said liquid fuel droplets is about 50 microns, with said fuel droplets in said fog of liquid fuel droplets being sized predominately in a range of from about 10 microns to about 30 microns.

26. A fuel delivery system as set forth in claim 25 wherein said liquid fuel fog-producing device comprises a tube containing at least one turbulence-inducing device, said tube receiving said metered quantities of said liquid fuel at one end thereof and providing said fog of liquid fuel droplets of a maximum predetermined size to said induction airflow from an opposite end thereof.

27. A system as set forth in claim 26 wherein said tube is configured having a carrier gas reservoir within which said metered quantities of said liquid fuel are provided.

28. A fuel delivery system as set forth in claim 27 further comprising a fuel heater for heating said liquid fuel.

29. A fuel delivery system as set forth in claim 28 wherein said fuel heater is operated intermittently.

30. A fuel delivery system as set forth in claim 28 wherein said fuel heater is operated continuously.